

## NEP Toxics / Nutrients: Core Group Brainstorming

Round 2 – \$5.47 million: July 12, 2011

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## TOXICS Brainstorming: \$2.25 million<sup>1</sup>

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### A1 – Toxics Scientific Investigation: \$550,000. (In Dale’s priority order<sup>2</sup>)

#### *Puget Sound Toxics Box Model “Enhancements and Data Integration”*

The Puget Sound Toxics Loading Analysis (PSTLA) included development of a Puget Sound wide box model to evaluate fate, transport and bioaccumulation of PCBs and PBDEs. This model is currently the most sophisticated analysis tool for a Puget Sound wide evaluation of the response of water, sediment, and biota concentrations to changes in toxic chemical source loadings. Because regional toxics data were lacking for a number of ecosystem components, accuracy of the model for evaluating source control scenarios was limited by uncertainty. This project builds on the PSTLA in five areas: 1) Incorporate recently-collected regional data to reduce uncertainty, 2) Expand the model to simulate selected metals, 3) Evaluate the effect of climate change on watershed toxic loadings, 4) Establish toxic loading reduction targets to meet environmental quality standards based on the modeled load/biota relationships, and 5) Develop a set of specific source control actions to meet the reduction targets.

#### *Evaluate Metals in Roof Runoff*

The Puget Sound Toxics Loading analysis identified roofing materials are one of the largest potential sources of cadmium, copper, and zinc in the Puget Sound Basin. Monitoring of selected roofing materials should be conducted to evaluate current levels of metals in roof runoff and the magnitude of reductions that might be achieved with alternate roofing materials. This could be proposed as a demonstration project in association

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<sup>1</sup> See application at end of document for more detail on the categories

<sup>2</sup> Original list (haven’t cross-referenced with Dale’s list):

- Add loading/concentrations from emerging contaminants / toxics not included in loadings report (17 chemicals in report)
- Synthesize phase 1 stormwater data
- Filling gaps in pieces of loadings report
- Box model (?)
- Conduct effectiveness monitoring
- Assess the safety of Puget Sound seafood
- Research toxics loading from septic
- Data for CAP development

with a local builders association to implement the use of alternate roofing materials and monitor the effectiveness of this action (Green Building?).

#### *Evaluate Petroleum Releases*

The Puget Sound Toxics Loading analysis estimated that motor oil drips and leaks (crankcase), minor spillage during vehicle fueling at the pump, and spillage during non-road equipment fueling as the largest releases of petroleum in the Puget Sound basin. Petroleum was identified as the largest contaminant release and loading in the study. A study should be conducted to refine estimates of actual releases of petroleum products from these sources. This information could also be used as a target source controls and establish baseline conditions to measure the effectiveness of source control actions.

#### *Assessment of Puget Sound Seafood- Seafood Data Gap Analysis*

Several significant data gaps need to be filled to understand the link between Puget Sound ecosystem health and human health. DOH characterized human health issues associated with consumption of Puget Sound English sole, rockfish, and Chinook and Coho salmon in a 2006 report based on data collected by WDFW from the early 1990's through early 2000's. Missing from the assessment were toxicity data for crab, other salmon species, and no information on chemicals of concern in Puget Sound shrimp species, an important data gap because Puget Sound produces significant amounts of commercial and recreational catches for these species. This is a unique opportunity to update the 2006 health assessment since WDFW has already collected Puget Sound spot prawn and crab muscle tissue over the past several months. This project will close critical data gaps in our efforts to characterize potential human health impacts from consuming Puget Sound crab and shrimp. Our proposal addresses the Puget Sound Action Agenda objective: "human health is supported by clean air and water." The project's actions will reduce exposure to humans by identifying contaminant levels in Puget Sound seafood, assess potential health impacts from consumption, and provide education and outreach to reduce exposure. Results will be used to implement seafood advisories and to fill in food web gaps for the Puget Sound Toxics Box model.

#### *Characterization of Emerging Contaminants*

The Puget Sound Toxics Loading Analysis focused on evaluation of approximately 17 chemicals. The list of target chemicals was chosen to represent a broader range of chemicals that have been shown to harm or have the potential to harm the Puget Sound Ecosystem. For the most part they represented chemical where existing monitoring data is available. Very little information is available on the distribution and occurrence of emerging contaminants in Puget Sound. Over 80,000 chemicals are currently in use. In addition, as older more toxic chemicals are phased out or banned other chemicals substitutes are implemented. PBDEs have been the focus of phase outs and bans only to be replaced by other halogenated flame retardants like hexabromobenzene and bis (2,4,6 tribromophenoxy) ethane that which are now being detected in the ecosystem. This project would begin to evaluate a selected set of emerging contaminants in Puget Sound. The target list would be developed by conducting a literature review of the findings of other emerging contaminant programs and available information on chemical production. Information from this project could be used to help prioritize efforts for safer chemical alternatives and other prevention programs to address emerging contaminants.

#### *Synthesis of Phase I Municipal Stormwater Permit Data*

A large body of stormwater monitoring data is being collected as part of the Phase 1 and potentially Phase 2 municipal permits. This data is submitted by individual permittees on an annual basis to Ecology. Compilation and analysis of this data across Puget Sound would provide an integrated analysis of stormwater conditions region wide. Compilation of this data would allow development of pollutant control strategies. The Washington Stormwater Center has proposed a similar project but it is unclear whether they will only be addressing BMP effectiveness data or all municipal stormwater data. (note: important activity but rating lower if Stormwater Center is covering this work)

### *Conduct Effectiveness Monitoring*

I would propose that we either establish an ongoing bucket (100K annually?) to tap for effectiveness monitoring from each year of funding or build effectiveness monitoring into selected projects similar to what we are doing for PAHs.

### *Evaluation of Cleanup Efforts on Contaminants in Seafood*

DOH proposes to assess the success of efforts to reduce contaminants in Puget Sound urban bays through the collection, analysis and assessment of contaminant levels in Puget Sound fish species. Given implementation efforts by numerous state and federal agencies, tribes, non-governmental organizations and businesses to reduce Puget Sound inputs of chemicals and cleanup of contaminated embayments such as Elliott Bay, Commencement Bay, Eagle Harbor and Sinclair Inlet, DOH and WDFW want to determine whether improvements in discharge rates and sediment contaminant levels translate into improved chemical concentrations in Puget Sound biota. This proposal links Puget Sound ecosystem health and human health while addressing the Action Agenda goal of human health – where the fish and shellfish are plentiful and safe to eat. The project's actions will be to reduce exposure to humans by identifying chemical contaminant levels in Puget Sound seafood, assess potential health impacts from consumption, and provide education and outreach to reduce exposure. Results will be used to identify fate and transport of contaminants in key marine indicator species and to update fish advisories.

### *Understanding and reducing air toxic deposition to the Puget Sound (Dale did not prioritize)*

Emissions from heavy duty diesel engines are the highest toxic air pollutant health risk in Washington communities along the Puget Sound. Diesel emissions are a major source of air pollutant deposition in the Sound. These air toxics are deposited directly from the atmosphere to the waters of the Puget Sound and they fall on the land and water and then washed into the Puget Sound from runoff and streams. Diesel emissions are a major source of deposition of air pollutants such as PAHs and PDBEs into the Sound. Fossil fuel combustion and biomass combustion are believed to be dominant sources of these toxics. The following projects would help us better understand toxic deposition trends and reduce toxic pollution in the Puget Sound.

### *Update Puget Sound Maritime Air Emission Inventory (Dale did not prioritize)*

Update the air emissions inventory to understand diesel toxics inputs and loadings.

In 2005, a baseline air emission inventory was created for overall maritime diesel engine air emissions in the Puget Sound region. That inventory was used to help understand diesel toxics inputs and loading in Puget Sound from air deposition. The inventory needs to be updated to assess the impact of current emission reduction strategies, proposed future strategies, the impact on emission levels due to economic changes, and to understand how those strategies and changes are affecting toxics deposition into the Puget Sound waters and air shed. This project is scalable.

- Total cost: approximately \$500,000
- Partnering: Puget Sound ports would provide about \$250,000 of the cost
- Request from NEP: \$250,000
- Completion: End of 2012

## **B1 - Safer Alternatives: \$0<sup>3</sup>**

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<sup>3</sup> Conduct safer alternatives using guidance from Round 1 (such as building materials). Wait until round 3 while Round 1 work is conducted for main safer alternatives analysis.

Move to Round 3? FFY12 funds.

Product testing in Round 2? Tie to CSPA or toxics loading assessment study. Need to connect to Puget Sound.

## B2 - PBT: \$850,000

### *Writing new CAPs:*

In 2006 Ecology finished the rule on persistent, bioaccumulative, and toxic substances (PBTs), WAC 173-333. The rule set principles and procedures for Ecology's PBT program, including establishing a PBT list and the development of chemical action plans (CAPs). CAPs identify, characterize, and evaluate uses and releases of a specific PBT, group of PBTs, or metals of concern, and recommends actions to protect human health or the environment.

Shortly after the rule became effective, Ecology worked with Dept. of Health to develop a multi-year schedule for the preparation of CAPs. Ecology and Health completed CAPs for mercury, lead, and PBDEs, and a cap for PAHs is in development. Once the PAH CAP is completed, the next and last PBT on the schedule is PFOS. Efforts are currently underway to update the schedule by identifying the next group of PBTs for CAP development.

Ecology has very few resources devoted to CAP development, yet CAPs are one of the few ways Ecology can comprehensively examine PBTs and make recommendations for protecting human health and the environment. PBTs are considered the worst of the worst because they remain in the environment for long periods of time and build up in organisms and in the food chain. PBTs travel long distances and cross environmental media. They span the boundaries of programs, geography and generations and cannot be addressed with single-media approaches. The power of CAPs is that through the rule-making, Ecology established an agreed-to (by stakeholders) process for addressing PBTs.

Ecology (with partners) has implemented many of the recommendations in these CAPs, reducing the impact of these materials on human health and the environment. Technical, social, political, or economic barriers have prevented full implementation of all recommendations. Limited resources (both staff and funding), have further challenged Ecology's ability to further implement recommendations. However, it makes sense to accelerate CAP development so that when the political and economic climates improve, we will have a suite of recommendations to commence work on.

Estimated Budget: \$601,139 (Toxicologist 3 for 4 years)

\$150,000 (associated costs for development of 3 CAPs – i.e. data purchase, contract facilitator, printing, travel, public process etc.)

Total (rounded) \$752,000

### *Implementing existing CAPs (crosswalk to see which actions need resources)*

- **PBT Enforcement.**  
Numerous PBTs/toxics have been recently banned for certain uses in Washington: PBDEs, mercury, bisphenol A (BPA), lead, coal tar, and copper (boat paint and brake bans not in effect yet). While it is illegal to sell the specified products containing these toxics, there is no active enforcement to check if the bans are working. Funding under NEP would include obtaining items likely to contain the banned products, sampling the products, and communicating with retailers and manufacturers. Oversight and actual enforcement would need to be done by an Ecology employee, but the sampling could be contract work. The scope of this effort would be very scalable to funding.
- **PAHs (CAP in progress)**  
More PAH work (do we plug Round 2 money into the Round 1 bucket?). Round 1 includes \$433,351 for PAH work (creosote piling removal and/or wood stoves). If this money goes out as an RFP, it would be good to have a larger pot to justify the administrative costs of administering an RFP. Even if it does not get distributed competitively, additional funding may be advantageous given the costs of PAH-related projects. DNR is writing a one-page scope of piling projects.

- **Mercury (still Working with Maria Peeler on her analysis -- TBD)**  
Auto switch funding – from Ken: “The funding is still available in the capital budget for switch removal.”
- **PBDE (options from CAP that may hold promise)**  
“Ecology should establish appropriate disposal and recycling practices for products containing PBDE flame retardants.”  
“DOH should continue to develop methods and materials for educating the public on how to minimize exposure to PBDEs. This will include information on the benefits of breastfeeding and advice about eating fish as part of a healthy diet.”
- **Lead (options from CAP that may hold promise)**  
Lead Ammunition: Because of its toxic effects and widespread use, lead ammunition is among the items listed in the CAP. The CAP does not include any recommendations to ban or regulate lead in any type of ammunition beyond current law. Ecology supports education and outreach to reduce the use of lead ammunition. Possible activity: education / outreach with hunters.

“Recommendation #14- Ecology should encourage additional recycling through education and product stewardship. Lead is not just hazardous waste, but it is also a valuable commodity. Automobile batteries are recycled at a very high rate, but an even higher recycling rate would recover hundreds of tons of lead in Washington each year. Many shooting ranges recover and recycle spent ammunition. New ranges should be encouraged to start with a recycling program and older ranges should be assisted with developing recycling. Ecology should explore whether a manufacturer supported product stewardship approach to design, manufacture, and take back of lead-containing products would be an effective tool in improving the recycleability of these products. Washington’s new electronics recycling law requires manufactures to take back covered electronic products (TVs, monitors, and computers) and took effect on January 1, 2009. The electronics recycling law does not cover all electronics that have lead. After the new recycling program is fully implemented, Ecology should evaluate whether it should be expanded to cover more items.

#### ***Landscaper certification program (certify landscaper and accredited sites):***

The culture of landscaping is changing. Residents and institutions are requesting pesticide-free landscaping and want to install rain gardens, cisterns, permeable pavement, and green roofs. Government agencies are requiring developments to mitigate stormwater pollution through low impact development and other green infrastructure. Many landscape professionals want to distinguish themselves as promoting and specializing in sustainable land care and in these new market areas.

Currently, there are not enough land care professionals in our region with practical knowledge about green infrastructure, restoration horticulture, and other sustainable practices. There is no program in Washington that comprehensively addresses all aspects of sustainable, ecological land care, provides practical knowledge for people in the field, recognizes individuals for their knowledge, and helps create a “green sector” of professionals focused on sustainable land care.

This project would assess and create market demand for adopting a sustainable land care training and accreditation program for landscape professionals. The benefits of this program are:

- Help reduce the overall use of pesticides and synthetic fertilizers in the soil and water.
- Increase natural stormwater filtration and reduce stormwater run-off through cutting edge landscape design, development, and maintenance.
- Increase the number of landscape professionals with credentials and comprehensive training in sustainable land care.
- Create a “green sector” and job market for people focused on sustainable land care.

-Introduce and establish a market-based approach for moving the landscape industry in the direction of ecological land care and environmental stewardship.  
Total estimated budget: \$305,000 (for 5 years)

#### *Research project on PBT fee (7095 financing study?)*

#### *Shorepower (plugging in cruise ships) (AQP) (Frank VanHaren):*

Install shore power infrastructure at Pier 66 in Seattle so that cruise line vessels can plug in rather than running their diesel engines for hotelling power needs, significantly reducing air toxic emissions. While docked, large ocean-going vessels, such as container, cruise, and general cargo ships, use auxiliary diesel engines to generate on-board electrical power for lights, climate control, and equipment. These docked, or “hotelling,” operations represent nearly one third of the maritime diesel particulate emissions at Puget Sound ports. Installing shore-side electrical power would allow these docked vessels to turn off their diesel engines, thereby reducing diesel particulate matter and other toxic emissions (PAHs, PDBEs), greenhouse gas emissions, and fossil fuel consumption. The US EPA, the Puget Sound Clean Air Agency, the Port of Seattle, Puget Sound Energy, cruise lines, and port tenants have all expressed willingness to partner both services and funding to help provide the millions of dollars needed to build the shore-side infrastructure to convert to electric shore power. Vessel owners have already invested in the ship-side infrastructure onboard their vessels to enable them to plug into shore power. Ship-side infrastructure cost is \$500,000 to \$1 million per vessel, dependent on vessel type.

- Total Cost: \$15 million for shore-side shore power infrastructure
- Partnering: Port of Seattle would provide \$14 million for shore-side shore power infrastructure
- Request from NEP: \$1 million – If rated highly by our group, Frank is willing to see if even a contribution of \$250,000 would help POS secure the other 75% from other partners. AQP may be able to chip in a couple of \$100K too.
- Completion: Late 2012 (dependent upon when full funding is achieved)

#### *All Shred Residue Source Control Project*

To shift the focus upstream in the lifecycle of automobiles, the U.S. EPA Region 10 and the Washington State Department of Ecology (Ecology) are jointly working to meet the goals detailed in the Automobiles and Product Stewardship: Roadmap for Collaboration (“Roadmap”). One of the priority actions identified in the Roadmap was to address auto shredder residue (ASR). Because ASR is a significant waste stream, Ecology is taking the lead on moving forward on addressing ASR, as recommended in the Roadmap. Specifically, Ecology is collaborating with the metal shredding industry to produce cleaner shred residue and shred sites. Three of the four shredding sites in Washington are located directly on the shores of the Puget Sound in heavily industrialized areas. Ecology estimates that 2,394,027,964 pounds of automobile related solid wastes and recyclable materials are generated annually (including recovered metal and shredder residue from auto hulks), and they often have toxic components which Ecology must manage. Instead of managing ASR only at end of life, Ecology intends to engage with stakeholders and determine best management practices for managing ASR both upstream and end-of-life. Ecology will take a leadership role in convening the stakeholder process and implementing the opportunities and best management practices identified.

The project has the following goals:

- Through a multi-stakeholder process, identify the best opportunities and best management practices for reducing or eliminating the impacts of ASR on the environment.
- Implement the opportunities and best management practices in conjunction with businesses and other states.
- Engage in national and regional initiatives that will result in reducing the materials and toxicity impacts of ASR

To complete the above goals, EPA and Ecology are working to jointly develop and implement programs to support the identified opportunities for addressing ASR by evaluating and developing:

- Data collection and verification system for scrap metal shredders;
- Certification program for vehicle recyclers;
- Compliance checklist for vehicle recyclers and/or appliance de-manufacturers;
- Investigative sampling study to determine most appropriate sampling method;
- Conduct scientific studies (air deposition and toxic loadings) to determine the environmental impact;
- Educational materials on specific items to remove from vehicles and /or appliances including posters, website, and/or other material; and
- Systems for addressing ASR upstream in design and manufacture, including green purchasing specifications for automobiles.

EPA and Ecology will jointly draft a Scope of Work for implementing projects identified in item 3 above. The Scope of Work will include a brief summary of the project, which goal it is implementing, a timeline, and an estimate of the costs.

Total project costs = \$360,000 for a two-three year grant to contract for services.

Funding request from NEP = \$180,000 to match existing state funding.

### **Stormwater Cleaning in Urban Basins**

As part of their Phase I municipal stormwater permit the City of Tacoma has chosen to implement and monitor the effectiveness of basin-wide storm sewer line cleaning in four priority drains. The targeted environmental outcome of this work is to determine whether this source control action is helping to protect sediment quality in Foss waterway following sediment remedial actions. Based on the first 2 years of data basin-wide sewer line cleaning appears to have been most effective at removing Polynuclear Aromatic Hydrocarbons (PAHs) (52 to 88 percent reductions in all four drains, including both light and heavy PAH fractions) from stormwater. Bis (2-ethylhexyl) phthalate (DEHP) is also showing a significant reduction of approximately 56 to 59 percent in Basin 237A and Basin 235, respectively. No significant reductions was seen in zinc during the 1<sup>st</sup> year, however there is now an 18 to 31 percent reduction in three of the four basins (Basins 235, 237A, and 254). Lead shows a significant reduction of 37 percent in Basin 235, and a marginally significant reduction of 16 percent in Basin 237A. No consistent reductions in TSS can be discerned from these data. These results provide compelling evidence that significant and measurable improvements in stormwater quality can be achieved through basin-wide sewer line cleaning. Tacoma will therefore prioritize other drains for line cleaning as resources and funds are made available. Funding could be provided to local governments to implement stormwater system cleaning in priority discharges. Basin-wide stormwater line cleaning appears to have been effective at removing PAHs, Bis(2-ethylhexyl)phthalate (DEHP), and zinc. An RFP for this project could be narrowly targeted at urban areas directly discharging to Puget Sound, or it could be more broadly crafted. And this kind of work doesn't take extra permitting; it is as shovel-ready as you can get. And it falls in line with the PSP's stormwater needs assessment that identifies storm system maintenance as a big bang-for-buck effort.

### **B3 - Education / Outreach \$200,000 == Justine write one paragraph (through Andrew)**

#### ***Green chemistry resource center***

(currently doing roadmap with WSU that will inform potential projects – draft at end of June??) Develop a competitive grant RFP to coordinate the WA Green Chemistry Roundtable and establish a regional green chemistry resource center. The RFP will require the grantee to identify, categorize, host, and disseminating relevant green chemistry information in Washington and from relevant outside sources in a resource user-friendly publicly available web resource. This grant will also promote active engagement of green chemistry practitioners in the public and private sectors at all levels of interest, and enhance the knowledge and



opportunities for the adoption and furthering of green chemistry in Washington. It will build a strong base of user support in Washington. Ecology will develop and administer the request-for-proposals. It is anticipated the RFP could be issued in early 2012. Funding request: \$100k annually for three years; \$350k total.

*Tied to toxics loading?*

*Scholarship fund for chemistry/toxicology*

*Green Chemistry Institute*

*Outreach to business*

## C2 – Innovative Treatment: Stormwater \$0<sup>4</sup>

## C5 – Compliance and Enforcement: \$650,000

### ***Build up LSC capacity at local government level (either additional people or improving program):***

Area: Local government storm water and hazardous waste management compliance assistance.

Details: An estimated 75,000 small Washington businesses are not covered by storm water permits and are conditionally exempt from hazardous waste regulations. Improper handling of wastes and products by thousands of uninformed small businesses contaminates our storm and ground waters. The Department of Ecology's (Ecology's) local government source control program (LSC) fills a critical gap in avoiding contaminated releases and recontamination of previously cleaned up sites. LSC provides technical assistance visits to correct business practices related to hazardous waste management, spill prevention, and storm water pollution and other environmental rules. Existing LSC resources cannot meet demand from local governments. This request will fund additional LSC specialists to conduct hazardous waste and storm water pollution prevention and technical assistance visits.

This request would fund up to 3 new full time Local Source Control Specialist specialists at an average cost of \$200,000 per specialists per biennium through interagency agreements. These costs cover the salaries and benefits, training and travel for the specialists, and local government indirect costs. It is anticipated that each local jurisdiction would conduct an average of 250 site visits per year, resulting in a total of 1, 500 visits for the biennium.

Depending on availability of funding, additional funding of \$100k is requested to support program enhancement, including environmental sampling needs, conducting electronic field data collection pilot project, development of spill prevention plans/spill kits, developing program branding and marketing.

Total project costs = \$400,000 per year

Funding request from NEP = \$400,000 annually for six years for a total of \$2.4 million.

### ***Outreach-to-business:***

Washington Storm Water Center

Identify, Plan, Prevent: Environmental awareness education and facility assessment development for businesses to support the protection of Puget Sound.

Area: Toxic metals reduction, including copper, cadmium, lead, mercury, and zinc

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<sup>4</sup> We are funding the Washington Stormwater Center in Round 1 – do they have the capacity to do more work in Round 2? Maybe in Round 3. *Does it make sense to add money to get stuff accomplished from Round 1?*

Details: This project will develop training materials including videos and brochures that will assist businesses in creating facility assessment, as outlined in the ISWGP SWPPP requirements, including an inventory of facility activities and materials that may potentially be sources of pollutants. In addition, this project will include 20, one-on-one site evaluations at volunteer businesses. Through these evaluations, staff and subcontracted experts of the Stormwater Technical Resource Center will perform site visits and evaluations to aid the businesses in creating their individual facility assessment. Where applicable, source control or structural BMPs will be suggested to address any sources of polluted stormwater runoff. A goal of educating 500 affected businesses and performing a minimum of 20 individual site evaluations has been set. Performing on-site, one-on-one evaluations is projected to be highly successful in producing on-the-ground action; face-to-face visits typically produce compliance rates of 90 percent or higher.

Total project costs = \$115,000  
Funding request from NEP = \$45,000

Note – this project selected for funding under W2R's Public Participation Grant Program. But PPG cannot provide full funding. The request to NEP fills the funding gap between PPG and the total project cost. (Full 12-page proposal on sharepoint).

## NUTRIENT Brainstorming: \$2.25 million

### TMDL implementation in Round 3

#### C1. On-the-ground implementation \$1,400,000

For the agriculture (\$500,000) and the residential/other (\$900,000), will we supplement Round 1 projects. See [../ALL ROUND 1 INVESTEMENTS \(early and regular\)/Agriculture/Ag\\_Nutrients.docx](#), [http://partnerweb/sites/W2R/tns/Shared Documents/ALL ROUND 1 INVESTEMENTS \(early and regular\)/Other Nutrient Implementation/RFP Nutrient Criteria.docx](http://partnerweb/sites/W2R/tns/Shared Documents/ALL ROUND 1 INVESTEMENTS (early and regular)/Other Nutrient Implementation/RFP Nutrient Criteria.docx), and the DOH PIC RFP. We may fund PIC projects that are too focused on nutrients for DOH to fund through their pathogen grant.

##### **Agriculture: \$500,000**

Do we know pounds of N per BMP

##### **Residential / other: \$900,000**

About 3 projects

Add a maximum amount \$300,000

Can we track how much N/P we're removing?

#### A2. Scientific Investigations \$600,000

(In Andrew's priority order). *Develop basic criteria for how we decide which projects.*

##### **State of the Science: Nitrogen in Marine Water**

(ATK: \$20,000?; Shelly hired under contract for toxics via Curt Hart)

The Environmental Assessment Program has summarized information on what we know about nitrogen in the Puget Sound ecosystem. Nitrogen reaches Puget Sound both from the Pacific Ocean and from local

**Commented [mlr1]:** Andrew: also need nominal time for EAP to pull together information and to interact with Shelly beyond just project management—more content management. Bump up a bit or split out \$10k for EAP.

natural and human sources. Human contributions associated with current levels of development have tripled the amount of nitrogen reaching Puget Sound from local watersheds and marine discharges of wastewater. Related projects will assess when and where those nutrient contributions are problematic. However, hot spots of nitrogen currently exist in the Puget Sound ecosystem. This project will combine already summarized information into a web site targeting the general public and local governments. The purpose is to highlight elements of various Department of Ecology publications that have quantified nitrogen from various sources and pathways to Puget Sound.

### *Effectiveness monitoring*

\$150,000 – stand alone project focus on Agriculture (Scott to provide estimates). Josh => start now in Samish?

Still need to figure out which bucket.... (Mindy: This should be part of the ag bucket and not taken out of the nutrients/scientific investigations bucket; the others listed below with no \$\$ must be funded)

### *Marine productivity*

writing a report on where we are at / independent third party review – where do we stand on marine productivity? \$60,000 (Chesapeake??)

The proposed report would present what we know about marine productivity in the Puget Sound system. Several organizations have collected marine productivity data over the years, but the data have not been compiled and published. One component of the proposed effort is an independent review of the productivity data. Ecology and the University of Washington have collected chlorophyll data as well. A few studies have identified the phytoplankton communities, either as relative dominance or by quantifying biovolume or mass. Recent advances in remote sensing have provided detailed information on surface conditions at a large spatial scale. Depending on resources available, this report could compile ongoing satellite imagery or gather a retrospective view concurrent with previous monitoring.

**Commented [mlr2]:** Andrew: These are two separate tasks. I wrote the paragraph as a larger “what we know” on all things productivity (based on data) and worked the independent review into it. Or, these could be split into two separate projects: (1) independent review/compilation of productivity and (2) what we know about productivity in the PS system.

### *Source Identification in Deschutes*

For other basins, postpone until South Puget Sound Dissolved Oxygen Study is done. If [N] > X in South Puget Sound, then do source id.

The Deschutes River has the highest nitrogen levels of the major rivers tributary to Puget Sound, and several other rivers and streams represent nutrient hot spots. The Budd Inlet ecosystem suffers from low levels of dissolved oxygen due in part to contributions from the Deschutes River, and an ongoing project is investigating the link between watershed nitrogen loads and low dissolved oxygen in South Puget Sound. This project will focus on identifying nitrogen sources and actions that reduce those levels. Most of the monitoring available to date has focused only on the mouths of the rivers and streams as they reach Puget Sound. The goal of this effort is to identify the streams and rivers with nitrogen levels >0.5 mg/L tributary to South Puget Sound, isolate the sources by upstream/downstream sampling, and recommend management actions to address those hot spots.

**Commented [mlr3]:** Andrew: I wrote this in a way that could focus on Deschutes or all rivers/streams >0.5 mg/L.

### *Attenuation in watersheds*

\$200K (USGS, Ecology, or university – stream complexity)

Recent analyses of ambient monitoring data for rivers tributary to Puget Sound suggests that summer nitrogen loads generated within Puget Sound watersheds are significantly attenuated before reaching Puget Sound. If so, then watershed and instream processes have a major mitigating impact that has not been quantified at the Puget Sound scale to date. The greatest attenuation occurs in rivers with the lowest nutrient levels, while high nutrient levels may have overwhelmed a watershed’s ability to dampen the effect of human contributions. Several small-scale studies have quantified this effect on streams in the Pacific Northwest, but no comprehensive assessment has been conducted in the Puget Sound watershed. Most pollution reduction approaches do not account for this process when establishing load reduction targets.

Further, increased stream complexity or low impact development approaches that mitigate stormwater could produce dual benefits to both nitrogen delivery to Puget Sound and to freshwater habitats.

#### *Sediment interactions*

\$200K project

Shallow areas near the shore of Puget Sound are most likely to experience low levels of dissolved oxygen due to the combination of low relative circulation, warm summer water temperatures, and proximity to watershed nutrient contributions. However, sediment nutrient fluxes may dominate in these shallow areas. Benthic fluxes of nutrients have been quantified in very few studies: Budd Inlet, Dabob Bay, Quartermaster Harbor, and in several South Sound inlets in the late summer only. More sediment flux data are needed because they are an important local cycling source in sensitive shallow areas and because very little information is available. This project would quantify sediment fluxes in other areas around Puget Sound, possibly focusing on the shallow waters of Whidbey Basin.

#### *Shellfish and nitrogen removal*

Shellfish institute – formalizing what we currently know (university project), \$40,000

A few recent and ongoing studies have evaluated the interactions between shellfish and water quality, but Puget Sound information is extremely limited. Other large estuaries have found that shellfish exert a strong mitigating effect on water column nutrient concentrations, which affects productivity and oxygen levels. Therefore, Florida and Chesapeake Bays have begun programs to quantify nutrient and dissolved oxygen benefits associated with current, historical, and future shellfish harvest. Restoring historical shellfish populations could have a secondary benefit to improving dissolved oxygen in Puget Sound. This initial project would compile the state of the science on the interactions between shellfish and water quality in Puget Sound and its inlets. The literature review will compile existing and ongoing studies and recommend future projects, as appropriate, to quantify the links.

#### *Effect of neap/spring cycle on dissolved oxygen in Puget Sound*

(~\$50K?)

The spring/neap cycle and mixing over the sills appear to affect dissolved oxygen in Puget Sound, but characterizing this influence further could have management implications. The Budd Inlet dissolved oxygen model, Puget Sound dissolved oxygen model, and recent observations appear to reflect a spring/neap pattern, with the lowest levels of dissolved oxygen associated with the period immediately following a neap tide. In a neap tide, the difference in tidal height between high and low tides reaches a minimum, and less volume exchanges throughout Puget Sound. Mixing at the sills is responsible for entraining lower water column nutrients into the euphotic zone, where it can spur productivity. This project would apply existing models to given scenarios to quantify the effect and couple those results with a compilation of observational data.

## **NEP GRANT APPLICATION – Background information on buckets listed above**

### **Goal**

The goal of the toxics and nutrients strategy is to protect and improve both human and environmental health in the Puget Sound ecosystem. Prevention is the smartest, most cost effective, and healthiest approach to reducing toxic threats and nutrient impacts. Thousands of toxic chemicals are in use today. They are in the air, water, soil, animals, fish, and our bodies. Some toxic chemicals impair development, some affect reproduction, some disrupt body chemistry, and some cause cancer. Some chemicals have limited impacts on humans but can be devastating to fish or other species. Nutrients occur naturally in the marine and fresh waters of the Puget Sound ecosystem, but human contributions of excess nutrients can lead to lower levels of dissolved oxygen as algae blooms and other organic matter decompose. The toxics and nutrients strategy must include activities to manage and clean up problematic levels in the environment.

As Lead Organization, Ecology will work with various partners at the federal, tribal, state, and local levels and non-governmental organizations, academia, and business to develop and implement projects in line with our strategic framework. To address toxics in the Puget Sound ecosystem we must reduce toxic chemicals in products and prevent toxic chemicals in stormwater. The nutrients approach focused on determining the extent that human sources of nutrients are affecting the Puget Sound ecosystem and how much reduction is necessary to meet water quality standards. Next, actions must be taken to reduce the loading of nutrients in a prioritized fashion. This strategic framework includes a multi-pronged approach to reduce toxics and nutrients from entering and impacting the Puget Sound ecosystem:

- A. Scientific investigation of toxics and nutrients.** One of the guiding principles of the Puget Sound Action Agenda is “to use scientific input in designing, implementing, and evaluating strategies.” Continued scientific work to better understand the sources, transport and fate of toxics and nutrients in the Puget Sound ecosystem is ongoing and will inform strategies implemented under this framework.
- B. Prevent substances from being used in the first place.** Goal 4 of the Draft FY 2011-2015 EPA Strategic Plan, identifies “preventing pollution before it is generated” as a key element of national environment policy. Prevention program elements under this strategic framework seek ways to eliminate or dramatically reduce the use and generation of toxic substances in the first place as a key approach to preventing toxic “pollution from being introduced into the Puget Sound ecosystem” (Priority C.1 from the Action Agenda). Washington’s bans on phosphorus in detergent and copper in brake pads are examples of reducing nutrients and toxics through preventative approaches.
- C. Limit or manage the amount of toxics and nutrients released into the environment.** Both the Puget Sound Action Agenda (Priorities A & C) and the Draft FY 2011-2015 EPA Strategic Plan (Goal 2 and Goal 3) call out actions to promote healthier communities and prevent releases of harmful substances. For example, Priority C.1 from the Action Agenda lists source control tactics such as education, pollution prevention, innovative technologies and technical assistance.
- D. Clean up substances that have polluted air, land or water.** While prevention is the priority of the framework, Ecology and its partners recognize the importance of removing substances from the environment to stop further exposures. Priority C.5 in the Action Agenda calls for prioritization of cleanup and remediation projects to reduce toxic loading into the Puget Sound. And Goal 3 of the Draft FY 2011-2015 EPA Strategic Plan refers to cleanup and restoration of contaminated areas.
- E. Measure program performance and use adaptive management to continuously improve programs.** The Puget Sound Action Agenda Priority E calls for the creation of an accountability management system. Ecology and its partners will work together on developing indicators, targets and measurement systems to track progress towards desired ecosystem outcomes.

### **STRATEGIC FRAMEWORK/INVESTMENTS (See Component 2 of work plan and budget for additional details)**

The strategic framework focuses on priority activities to prevent or reduce toxic substances and problematic nutrients, building on activities in both the Puget Sound Action Agenda and Draft FY 2011-2015 EPA Strategic Plan. Projects will focus on implementation activities, but may develop, refine, or strengthen existing programs, or start new work. This strategic framework identifies high level program areas, and addresses how we will perform activities identified in the RFP.

#### **A. Scientific Investigations of Toxics and Nutrients**

##### **(A1) Identify and Prioritize Sources of Toxics Contributing the Most and Having the Greatest Impacts on Puget Sound -**

**Characterize Substances, Sources, Pathways and Effects** – For toxics, there are troubling gaps in the available data and state of knowledge on many widely used chemicals (Draft FY 2011-2015 EPA Strategic Plan, Goal 4). Building on the results of the Puget Sound Toxics Loading Assessment and Synthesis Analysis, continued scientific work to better understand sources, transport and fate of toxics in the Puget Sound ecosystem will be needed (Action Agenda C.1.1.10). While the ongoing efforts will result in increased understanding of the relative sources, we anticipate the need to collect supplemental data to refine levels of toxic

substances in products, humans, animals and the environment. The topics will be developed based on the outputs of the current effort. The monitoring efforts also include evaluation of the public health and environmental risks (including health effects in biota) posed by pharmaceuticals, personal care products and other emerging contaminants. We will pilot innovative monitoring program technologies in key areas of Puget Sound that may include remote sensing, continuous sensors, and sediment studies. To effectively address toxic threats, we need to understand major sources and critical pathways to the environment and humans, and use this information to focus prevention, management, and cleanup actions. Effectiveness monitoring of environmental endpoints will be included and detailed during the first year, but internal resources will be used (no round 1 funding).

**(A2) Identify and Prioritize Sources of Nutrients Contributing the Most and Having the Greatest Impacts on Puget Sound - Characterize Sources, Pathways and Effects** – Several ongoing efforts are identifying and quantifying threats posed by the largest sources and pathways of nutrients (wastewater treatment plants and rivers flowing into Puget Sound). These fully funded projects include the Puget Sound-wide Dissolved Oxygen Model developed by the Pacific Northwest Labs and Washington Department of Ecology; South Puget Sound Dissolved Oxygen Study developed by Ecology; and the Hood Canal Dissolved Oxygen Program developed by the University of Washington and its partners. This area of strategic investment will leverage these existing nutrient efforts to identify other areas of concern or topics in need of follow-up actions. More detailed analysis may be needed for some areas such as Whidbey Basin, and targeted management actions will be identified in the next year. Nutrient monitoring may include point and nonpoint sources, tributaries, air deposition, and groundwater. We will pilot innovative monitoring program technologies in key areas of Puget Sound that may include remote sensing, continuous sensors, and sediment studies. Effectiveness monitoring of environmental endpoints will be included and detailed during the first year, but internal resources will be used (no round 1 funding).

## **B. Prevention Activities**

**(B1) Reduce Use and Generation of Toxics Through Development of Safer Alternatives - Conduct Alternatives Assessments** – Ecology will lead a collaborative process with stakeholders to define elements of and finalize a method for conducting alternative assessments, using existing models as a starting point for discussion. Based on the results of the Puget Sound Toxics Loading Study and Synthesis Report, we will identify chemicals or products that are good candidates for scientifically defensible assessment and work with partners (sub-awardees) to conduct alternatives assessments. We will support safer alternatives research, promote the use of safer alternatives, and create incentives to encourage the development of safer alternatives. This aligns with statements in Goal 4 of Draft FY 2011-2015 EPA Strategic Plan, “accelerating work to identify safer alternatives,” and “evaluating chemicals in use.” It also aligns with items C.1.1.2 and C.1.1.4 in the Action Agenda, “promote safer chemical alternatives,” “advocate for safer chemical substitutions,” and “development and use of safer chemical alternatives and products”.

**(B2) Build on Programs to Prevent PBTs (Persistent Bioaccumulative Toxics) and Other Chemicals of Concern from Entering Puget Sound** – We will continue and enhance current efforts to phase out the use of PBTs by accelerating Ecology’s work to complete Chemical Action Plans. We will use a sub-award process to develop innovative methods to reduce the use of PBTs and other chemicals of concern (endocrine disruptors, metals, pesticides, diesel particulates, and emerging contaminants such as pharmaceuticals, flame retardants, plasticizers, personal care products, and nanomaterials). Actions may include implementing Washington’s Beyond Waste Plan (Action Agenda item C.1.1.6), Ecology’s PBT Strategy (Action Agenda near term action C.1.2), and implementing or enhancing air management plans (Action Agenda near term action C.1.2.6).

**(B3) Provide Education and Technical Assistance** – We will work with PSP, ECO-Net, and LIOs to implement the regional public engagement work plan being developed by PSP’s education and outreach team. This team will play a lead role in coordinating LIO and LO delivery of regional and watershed messages. Understanding how LIOs can tap into and leverage existing ECO-Net capacity will be a key part of this effort. The ECB would inform and help implement the public education and outreach portion of the strategy in coordination with PSP’s overall effort. This will include feedback on an integrated work plan to integrate the public awareness and engagement efforts of each LO with those of PSP’s work. Our goals would include incorporating clear, consistent public health and environmental messaging about reducing toxic threats and how to control nutrients for businesses and the public. We will support programs to train professionals such as architects, landscapers, teachers, engineers and chemists and to engage volunteer citizen scientists to address toxic threats and promote green chemistry approaches. Action Agenda item C.1.1.1 specifically calls out education and technical assistance actions, “conduct focused business and citizen outreach aimed at controlling and reducing high priority chemicals, pharmaceuticals, and personal care products.” And Action Agenda near term action C.1.1 states “conduct a focused outreach campaign for the public and businesses to reduce pollutants identified in toxic loading and other studies that are priority threats to Puget Sound”. Round 1 funding will be used for a targeted educational work around agricultural issues, in coordination with, but beyond the current scope of work being conducted by the Puget Sound Partnership.

## **C. Management and Control Activities**

**(C1) Fund Activities to Prevent, Reduce, and Control the Sources of Nutrients** – This proposal would develop and implement programs to address low dissolved oxygen concentrations and other nutrient-related impacts in Puget Sound. This area of

investment would fund implementation projects beginning in 2011, with an emphasis on Hood Canal (lowest dissolved oxygen), Budd Inlet (low dissolved oxygen), Whidbey Basin (large agricultural sources of nitrogen), or other areas with known problems. These projects would not only address specific problem areas but they would evaluate their effectiveness for use throughout Puget Sound. Beyond Round 1 it would create a funding source for South Puget Sound to conduct TMDL (or other management plan) implementation and then move to the rest of Puget Sound. Funding can be used to reduce nitrogen loads from on-site septs, residential or agricultural fertilizer use, other agricultural sources of nitrogen, wastewater treatment plants, stormwater, or other human-caused source of nutrients. It can address marine or freshwater and nitrogen or phosphorus. All projects funded in this category must result in reduced nutrient loading.

**(C2) Continue to Upgrade and Invest in Innovative Treatment and Control Technologies to Prevent, Reduce and Control the Release of Toxics and Nutrients** – We will research technologies and strategies to prevent, reduce, or control the release of toxics to stormwater and other non-permitted sources. We will advance infrastructure upgrades and treatment technologies that will help control stormwater flow and improve water quality in accordance with Action Agenda item C.1.1.7, “continue to invest in technologies that reduce toxic pollutants.” We will continue the transition of the region to the LID stormwater management approach by introducing LID concepts during the municipal NPDES stormwater permit process. We seek partners to provide training and technical assistance on LID approaches. We will continue to identify and promote best management practices (Action Agenda near term action C.2.3). For nutrients, both permitted and non-permitted discharges will be addressed and technical assistance will be provided to entities in need. Ecology and others are currently evaluating nutrient removal technologies for municipal wastewater treatment plants. The effectiveness of non-proprietary technologies for removing nitrogen in septic systems needs to be evaluated.

Growing concerns of nitrogen loadings from on-site sewage systems to the Puget Sound has lead to the need for research efforts to evaluate alternative approaches to managing decentralized nitrogen treatment that are cost-effective, reliable, and low maintenance. An On-Site Sewage Nitrogen Removal Technologies study will evaluate two new innovative public domain technologies that have shown to be capable of removing total nitrogen greater than 80% from various wastewater sources in other areas of the country. The goal of the study is to examine the nitrogen removal rates of the technologies through performance monitoring under field conditions in the Puget Sound basin.

**(C3) Encourage Agriculture BMP Implementation, and Other Actions to Reduce Surface Water, Ground Water, and Air Quality Impacts From Agriculture** –

Ecology will work closely with the agricultural community (including the Washington State Department of Agriculture, the Washington Conservation Commission, Natural Resources Conservation Service, and local Conservation Districts) to develop approaches to manage and control pollution from agricultural practices. More detailed strategies, task, outputs and outcomes will result from these discussions. Since agriculture manure management and management of other agricultural practices is a significant consideration in nutrients and pathogen control, Ecology will work closely with the Washington State Department of Health (DOH) – the lead organization for the pathogen cooperative agreement – to include nutrient management in other agricultural related projects funded under the pathogen agreement. (Funded through pathogen grant).

**(C4) Strengthen Authorities and Policies and Develop Decision-Making Tools** – We will strengthen our authorities to deal with toxics in products and the environment. We will ensure our policies align with the state reducing toxic threats goals and principles, evaluate existing standards to assure they adequately protect human health and the environment and prevent recontamination of cleanup sites, modernize our information systems, and develop decision making tools to guide our work. Emerging chemical policies, including regulation of nanomaterials need to be addressed before these materials go into widespread commerce and use, as identified in Draft FY 2011-2015 EPA Strategic Plan Goal 4. We will work with EPA on modernization of the Toxic Substances Control Act (TSCA), while simultaneously strengthening the state’s ability to address toxic substances by requiring submission of information, producer responsibility, or outright bans. In addition to Ecology’s state and local partners, the Stormwater Technical Resource Center (STRC), co-managed by Washington State University and the University of Washington Tacoma along with their partners, is positioned to assist in developing tools, guidance and models to assist in decision making.

**(C5) Increase Compliance and Enforcement of Environmental Laws and Standards** – Goal 5 of Draft FY 2011-2015 EPA Strategic Plan, asserts that enforcement has a role in achieving the goals of this strategic framework. “Protect human health and the environment through vigorous and targeted civil and criminal enforcement. Assure compliance with environmental laws.” It goes on to state, “Enforcement reduces direct human exposures to toxic chemicals and pesticides and supports long-term human health protection.” Ecology’s Hazardous Waste and Toxics Reduction program has noted an increase in compliance violations. Making progress towards toxics and nutrients reductions will require compliance resources both inside and outside the agency to appropriately enforce environmental laws. We will support technical assistance programs such as local source control as well as innovative cost-share and loan programs for business that prevent pollution and improve air and water quality.

**(C6) Evaluate Whether Water Quality Standards are being met for Toxics and Nutrients in the Puget Sound Ecosystem** – For nutrients, Ecology will use the ongoing studies to evaluate if the water quality standards are being met. Ecology will work with

our partners and stakeholders in developing the TMDLs or other mechanisms as needed to improve water quality. For toxics human health criteria, the fish consumption part of toxics water quality standards need to be evaluated and updated. As part of Round 1 subawards, Ecology would like to provide funding to the Northwest Indian Fisheries Commission to work with federally recognized tribes in Washington, and tribes that have usual and accustomed lands in Washington, to develop a fish consumption rate that is acceptable to the tribes for development of water quality criteria for toxics. Many toxics issues in Puget Sound may be successfully addressed by funding Straight-to-Implementation projects for marine or freshwater.

#### **D. Cleanup Activities**

**(D1) Prioritize and Accelerate Remediation and Cleanup of Hazardous Waste Sites in the Puget Sound Area –** Draft FY 2011-2015 EPA Strategic Plan Goal 2 and Goal 3 acknowledge the need to cleanup and restore waters in order to support healthy ecosystems and promote sustainable, healthier communities. Action Agenda near term action C.5.1 calls for continued implementation of high-priority remediation and clean-up projects. While Ecology believes we need to shift resources to prevention approaches, we also believe there must be some level of cleanup. There are several ongoing activities designed to prioritize and accelerate cleanup projects in Puget Sound. Ecology will refine prioritization criteria for cleanup to incorporate the PSP's guiding principles for ecosystem management. Ecology is also developing rule revisions to clarify cleanup requirements for sediment cleanup. However, the key challenge in the next several years will be to better align and sequence source control, cleanup, and remediation projects. This will allow us to more effectively prevent recontamination of areas where legacy contamination has been cleaned up. This will also support efforts to reduce toxic loadings, restore ecosystem processes, and implement long term stewardship, as called for in Action Agenda item C.5.

#### **E. Administration, Effectiveness Monitoring Performance Measurement and Adaptive Management (See Component 3 of the work plan and budget for details)**

**(E1) Monitor for Effectiveness, Measure Performance, and Adapt Programs as Necessary.** Adaptive management provides a feedback loop to ensure that efforts to reduce threats from toxics and nutrients are both successfully implemented and result in positive environmental change. Each of the areas of investment described above will identify performance measures for both implementation and environmental results for that specific area. A1 and A3 will include environmental performance measures. This strategic investment area compiles that information and includes the overall coordination role. Appropriate program and environmental effectiveness monitoring will depend on specific health/impact metrics to measure recovery. All projects will include a performance management system that includes adaptive management, monitoring, accountability and coordinated data management. These tasks are outlined in the Action Agenda Priority E, "Build an implementation, monitoring, and accountability management system." Ecology will accomplish this work in coordination with other Lead Organizations, the Partnership/Management Conference, and other arms of the Puget Sound Partnership, aligning with the dashboard of ecosystem indicators where possible.